

The NHV system allows good air mixing, so there is little internal variation in temperature or humidity throughout the room. Further, because the air is in motion and is passing through the mass of sweetpotatoes (no root is more than one-half the depth of a pallet bin—approximately 25 inches (63.5 cm)—from a moving stream of air), there is opportunity for heat transfer. Good heat transfer is important for warming the sweetpotatoes at the beginning of the curing cycle, cooling them at the end, and for removing the heat of respiration throughout the storage period.

A series of motorized dampers is located on the exterior wall across the plenum from the fans. While these dampers remain closed, only internal air is circulated through the pallet bins. These dampers are opened when outside air is required for ventilation or cooling. Air is pulled into these openings because of the slight negative pressure the fans create in the plenum. The size and number of these dampers are determined by the capacity of the room. When correctly designed, approximately one-third of the air passing through the fans will be pulled from outside, with the remainder of the air recirculated from the stack of pallet bins. The air displaced by the incoming air exits the room through gravity shutters located near floor level at the end of the room opposite the plenum.

The NHV system offers a number of improvements to sweetpotato curing and storage facilities:

- Air moves efficiently and consistently through the large mass of sweetpotatoes, providing ventilation and heat transfer to minimize both in-building variations and fluctuations because of changes in outside temperature and humidity. Warming sweetpotatoes at the beginning of curing, cooling at the end, removing heat, and warming seed sweetpotatoes for pre-sprouting before bedding are greatly enhanced by NHV's efficient heat transfer.
- Because the air passes through the mass of sweetpotatoes horizontally, the NHV system does not use floor trenches. The floors may be the standard four inches of welded wire mesh or fiberglass-reinforced concrete over a packed grade. This feature substantially reduces the cost of construction and allows NHV systems to be installed in many existing structures.
- Economical standard pole-type or steel column and girder buildings may be used without expensive custom modifications or the need for excessively wide spans.
- The system can accommodate a large variety of room sizes. Individual rooms have been built as small as 20 by 50 feet (6.1 by 15.2 m), with 6,000-bushel capacity, to as large as 120 by 100 feet (36.6 by 30.5 m) with 96,000-bushel capacity. This flexibility is particularly attractive in the larger facilities with lower per-unit construction and

operating costs. Larger rooms may make slightly more efficient use of space than smaller rooms but can result in undercured or overcured roots if not filled on a timely basis. Smaller rooms, however, are more quickly emptied and taken out of service.

- The NHV system makes very efficient use of floor space. For the system to operate properly, the pallet bins must be placed tightly together, in straight rows, with as little space between bins as possible. The system has worked well with bins stacked six, seven, and even eight high, but it works best if all the bins are stacked to the same height. It is also better if all the pallet bins are nearly the same size and of the same construction, as this facilitates proper stacking and minimizes air leakage between bins. Some air will inevitably short circuit between the bins, both in the horizontal and vertical direction, which is why the fans are sized to accommodate this leakage.
- Because the cost of outfitting a building with NHV is modest, there is no advantage to having separate rooms for curing and storage. This makes better use of space and eliminates the need to move the sweetpotatoes at the end of curing—an operation that is time consuming, expensive, and invariably results in damage to the roots.
- Eliminating substantial variations in temperature and humidity inside the room allows for more precise and sophisticated controls that help maintain quality and reduce energy usage. Although many NHV facilities are successfully managed by electro-mechanical controllers (thermostats, relays, timers), the full benefit of NHV technology is realized by using programmable logic controllers (PLCs). These industrial, computer-like devices may be programmed not only to control the temperature and humidity but also to monitor and limit energy use, collect data, sound alarms, and provide security.
- The ventilation fans mounted in the roof of traditional sweetpotato storage facilities are often a source of leaks and other maintenance problems. In an NHV facility, air inlets and outlets are mounted on the sides of the building, which makes them much easier to install and maintain and less likely to leak.
- Various sprays are effective against insect pests. Until recently, however, it was difficult to consistently distribute the material throughout the mass of sweetpotatoes. Even in facilities with automatic insecticide dispersal systems, complete coverage is difficult. The uniform air movement in NHV facilities effectively distributes insecticides throughout the room for maximum coverage.

For more information on specific construction guidelines for the NHV system, see Appendix 3.